

Abstract Submitted
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Absence of Thermodynamic Critical Thickness in Ferroelectric Thin Films A.M. BRATKOVSKY, Hewlett-Packard Laboratories, A.P. LEVANYUK, U. Autonoma Madrid, Spain — We have constructed the external field versus temperature/thickness phase diagram for ferroelectric thin film with real electrodes, and considered the effect of inhomogeneous elastic strains. The main features of the diagram are: (i) The single domain state is at best metastable and is never thermodynamically stable [1]. Therefore, the “critical thickness for single domain ferroelectricity” does not exist in thermodynamic sense. The only “critical thickness” of a practical importance is the one corresponding to a desired retention time of a metastable single domain state. (ii) Upon lowering external electric field, there is a phase transition between homogeneous and inhomogeneous states. For a part of the interval, the phase transition is second order while for another one it is first order, i.e. there exists a tricritical point on the phase diagram. In the elastically anisotropic materials, the elastic coupling for the films on substrates may have either stabilizing or destabilizing effect, depending on specific material [2].

[1] A.M. Bratkovsky and A.P. Levanyuk, arXiv: 0801.1669.

[2] A.M. Bratkovsky and A.P. Levanyuk, Phys. Rev. Lett. 100, 149701 (2008).

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